

# NEWSLINE

Published weekly for employees of Lawrence Livermore National Laboratory

Friday, March 11, 2005

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## Telescope to peer into deep sky

By Anne M. Stark

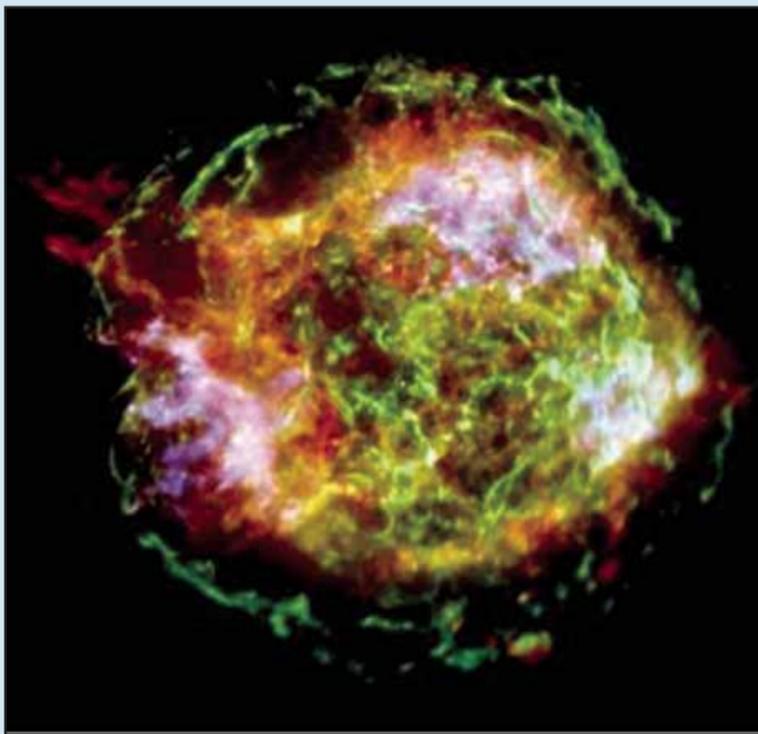
NEWSLINE STAFF WRITER

If all goes well with a technical study approved by NASA for this year, Lab scientists will use a pioneering telescope to understand how stars explode, producing elements like calcium, that end up in our bones and teeth.

The telescope, named NuSTAR (Nuclear Spectroscopic Telescope Array), would help scientists obtain for the first time a sensitive high-energy (hard) X-ray map of the sky in extraordinary resolution.

Not only will the telescope be able to tell us about the elemental nature of the human body, but it will be able to find new black holes and understand how matter falls into them and churns out of supernovae.

"NuSTAR will let us take a census of the deep sky and understand how black holes influence galaxy formation," said Bill Craig of I Division, who serves as the NuSTAR project scientist. "Determining how galaxies evolved is a



NuSTAR will help scientists understand remnants of supernovae, including this one of Cassiopeia A.

big question and it's something we have to answer. NuSTAR will help us do that."

NuSTAR has been earmarked by NASA for additional study in the competitive Explorer Program, which pinpoints new proposals for space missions that can be launched at low cost.

See NuSTAR, page 5

## Remnants of the 'big bang' help researchers explain makeup of universe today

By Anne M. Stark

NEWSLINE STAFF WRITER

By studying the cosmic microwave background left over after the big bang, Edward Wright hopes to better understand the conditions of the early universe.

Wright, a UCLA physics and astronomy professor, explained to a large crowd last week how studying the cosmic microwave background (CMB), the afterglow radiation left over from the big bang, can help explain the makeup of the universe today. Wright visited the Laboratory March 3 as a speaker in the Director's Distinguished Lecture Series.

Early measurements of the CMB indicated that the sky was nearly uniform. However, Wright said the launch of the Cosmic Background Explorer (COBE) satellite in 1992 indicated cosmological fluctuations — akin to seeing the mountains, cities, forests and deserts that cover the continents on Earth — in the microwave background temperature.

"What we discovered is that the cosmic microwave background has been relatively unchanged since two months after the big bang," Wright said. "By studying the fluctuations in the CMB, we disproved that the universe is in a steady (uniform) state."

These temperature fluctuations, which will continue to be looked at with the Wilkinson Microwave Anisotropy Probe (WMAP) mis-

See WRIGHT, page 8

## Collaborators and former students pay tribute to Nobel laureate and pioneering physicist Hans Bethe

Nobel laureate Hans Bethe, the last of the giants of the golden age of 20th-century physics and the birth of modern atomic theory, and one of science's most universally admired figures, died quietly Sunday evening at his home in Ithaca, N.Y. He was 98.

At his death, Bethe was emeritus professor of physics at Cornell University, the institution he joined in 1935 after fleeing Nazi Germany because his mother was Jewish. He was one of the most honored members of the faculty in the university's 140-year history for his work in revolutionizing our perception of the real world. But he was equally admired for his reputation for integrity, humility and concern that made him the conscience of science.

"Hans Bethe was one of the towering icons of the 20th century," said Director Michael

See BETHE, page 7

## Hands across the sea



BOB HIRSCHFELD/NEWSLINE

From left: Gonzalo Leon, vice-rector for research at the Universidad Politecnica de Madrid; J. Manuel Perlado, director, Institute of Nuclear Fusion, Universidad Politecnica de Madrid; and Lab employee Ted Tarasow, visit the the Fourier Transform Mass Spectrometry Lab in the BioSecurity and Nanosciences Laboratory Bldg. 154.



Labor movement pioneer to speak

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Science & Engineering Fair coming

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Getting a jump on spring

— Page 8



## LAB COMMUNITY NEWS

### Weekly Calendar

Technical Meeting Calendar, page 4

Monday  
**14**

The **B Division/LLLWA spring book sale** runs today through Friday (March 18) at 11:30 a.m. to 1:30 p.m., in Bldg. 132, room 1200 (Q- or L-cleared access only). Several boxes of books written in Dutch, and several boxes of vintage murder mysteries, in addition to the usual selection of fiction and nonfiction will be on sale. All proceeds are used to buy Christmas gifts for needy children and to fund LLLWA scholarships. Each year the sales help agencies in Alameda, Contra Costa and San Joaquin counties, plus individual families in need. For more information, call Lynn Groves, 2-1684, or Edith Greene, 3-0252

Tuesday  
**15**

Today is the deadline for high school students to apply to **COSMOS** (California State Summer School for Mathematics and Science), a month-long residential program for talented and motivated students. Students may apply to one of four COSMOS sites located on the University of California campuses at Davis, Irvine, San Diego and Santa Cruz.

Each site offers different theme-based course clusters that reflect the unique resources and specialties of the campus. Students learn cutting edge science, engineering, mathematics and biomedical sciences from distinguished faculty and select high school teachers. For more information about COSMOS, go to [www.ucop.edu/cosmos](http://www.ucop.edu/cosmos).

Wednesday  
**16**

The Living Well caregiver workshops series begins today with **"Caring for Aging Adults,"** from noon-1 p.m. in the Bldg. 361 auditorium. The goal of the workshop is to understand and address caregiver needs, the importance of a caregiver action plan and to examine ways to take care of yourself as a caregiver. Workshop presenter Robbie Smith is an elder care consultant at the Older Adult Resource Center at El Camino Hospital, where she counsels families and individuals on issues related to aging. The series, sponsored by the Worklife Programs Office, Health Services Department and the Employee Assistance Program/CONCERN, will continue with additional workshops in April and May. For more information, call 2-9543.

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A **Fidelity retirement counselor** will be available March 16 and 22 to assist with assessing the current state of retirement accounts, learning how to diversify, planning asset allocation and identifying income strategies. Fidelity Investments Mutual Funds are available to UC's workplace retirement plan participants in addition to the UC-managed investments pools. To set up a consultation with a Fidelity representative, call 800-642-7131. When calling, be sure to specify that you are an LLNL employee.

### IN MEMORIAM

#### Robert H. Ausfahl

Robert H. Ausfahl of Rossmoor died Feb. 16. He was 88.

Born in Arizona, he was the only child of Rowena and Fred Ausfahl. He moved to California with his parents when he was 8, attended school in Richmond, and later graduated from UC Berkeley with a degree in civil engineering.

While at Berkeley, he worked on Standard Oil of California (now known as Chevron Texaco) oil tankers, sailing between California and the east coast. While a student at UC Berkeley, he met his future wife, Doris. After graduation, he joined the Chevron Company for a lifelong career, retiring as an executive in 1973. While at Chevron, he was selected as a Sloan Fellow and received a master's degree in 1950 from the Massachusetts Institute of Technology.

Upon returning to Chevron in the 1950s, he participated in an executive loan program to the

U.S. government and later became one of the founding managers of LLNL. He was active in the American Petroleum Institute in a variety of leadership roles.

Ausfahl had many interests. He loved the Sierras, was an avid fly fisherman, golfer, followed the Oakland A's and UC Berkeley sports, and traveled often to Hawaii.

Ausfahl is survived by his wife of 65 years, Doris; sons, King and Bill; daughter-in-law, Trudy; grandsons, Tom, Andy and Matt; granddaughters-in-law, Corinna and Ali; and great-granddaughters, Emma, Catharina, Charlotte and Daisy.

Family and friends are invited to a celebration of life on Monday, March 14, at 11 a.m. at Rossmoor in the Fireside Room at the Gateway Clubhouse. The family requests that memorial contributions be made to the donor's favorite charity.

#### Janet Plemons

Janet Plemons, a senior machinist in the Manufacturing and Materials Engineering Division, died March 2, after suffering an aneurysm. She was 50.

A resident of Tracy, Plemons joined the Lab's apprenticeship program in 1980 and had worked as a machinist throughout her 25-year career. Prior to joining the Lab, she worked at Caterpillar, FMC and Xerox.

Born in Seymour, Tenn., she lived in Ohio for a short time before moving to the Bay Area, living in Fremont and Hayward.

Plemons was an avid racing fan and a member of the racing club SCCA, for which she raced Porsches and held the women's title. Plemons also enjoyed restoring classic cars. In 1996, she and co-worker Linda Leonardini completely remodeled a 1935 Chevy and entered it in several car shows.

"She loved anything that went fast — cars, motorcycles, boats, you name it," Leonardini said. One of Plemons' most recent projects was a souped-up '93 Mustang, which she began racing at Infineon in Sonoma.

Plemons died "doing what she loved," Leonardini said. She was working on a '53 Comet she was restoring when she began complaining of a strong headache. Moments later she collapsed and fell into a coma.

"She had so many friends and she will be missed," Leonardini said.

Survivors include Plemons' mother, Wilma; siblings Terry Trujillo, Deana Hugen, Matthew Evans, John Evans and Paula Ott; and several aunts, uncles and cousins.

Services for Plemons were held Tuesday in Tracy. Contributions in her memory may be made to a charity of choice.

#### Gary E. Sommargren

Gary E. Sommargren, a physicist with LLNL for more than 20 years, died Tuesday, March 8, of amyotrophic lateral sclerosis (Lou Gehrig's disease).

A resident of Santa Cruz, Sommargren worked in the Optics Group and EUV Lithography Group, and most recently on assignment with UCO Lick at UC Santa Cruz.

He is survived by his wife of 36 years, Claire, son Erik, and daughter, Alaine.

A funeral Mass will be held on Friday, March 18, at 9:30 a.m. at St. Joseph's Church, 435 Monterey Avenue, Capitola, followed by a reception for family and friends at his home in Santa Cruz.

Sommargren's preferred charities for memorial donations include the: ALS Association, Bay Area Chapter; Muscular Dystrophy Association, ALS Division; Hospice Caring Project of Santa Cruz; the ALS Center at UCSF, and the Sempervirens Fund.

### Newsline

Newsline is published weekly by the Public Affairs Office, Lawrence Livermore National Laboratory (LLNL), for Laboratory employees and retirees.

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# UFWA leader to discuss role of women in labor movement

Employees are invited to attend a presentation by Dolores Huerta, one of the century's most powerful and respected Mexican-Americans and labor movement leaders, on Tuesday, March 15 at noon in the Bldg. 123 auditorium, in honor of Women's History Month and Cesar Chavez Day.

Huerta co-founded the United Farm Workers Association (UFWA) with Cesar Chávez in 1962. A former teacher and mother of 11 children, Huerta has played a major role in the American civil rights movement.

Using tactics of non-violence, she organized a successful boycott of California table



Dolores Huerta

grapes that lasted five years and resulted in the entire California table grape industry signing a three-year collective bargaining agreement with the UFWA. Huerta effectively negotiated contracts with growers, lobbied, organized strikes and boycotts as well as spear-headed farm worker political activities.

Huerta continues to work to protect farm workers' and women's rights. She has served as vice-president for the Coalition for Labor Union Women, the vice-president of the California AFL-CIO, a UC

Regent, and is currently a board member for the Fund for the Feminist Majority. Huerta

was inducted into the National Women's Hall of Fame in 1993 and received Ms. Magazine's Women of the Year Award in 1998. This month, the California State Assembly will honor her with the 2005 Women of the Year Award.

Huerta will talk about her experiences working with Cesar Chávez and founding the UFWA; the women's impact on the protests and marches; how she was perceived and accepted; how she overcame stereotypes and obstacles; and the current state of migrant farming rights and living conditions.

The talk is co-sponsored by the Lab's Amigos Unidos Hispanic Networking Group, the Women's Association and the Worklife Center in honor of Women's History Month and Cesar Chavez Day. For more information, please contact the Worklife Center at 422-9543.

## BRIEFLY

### Construction on storage tanks

To comply with the new state requirements, construction has begun on the underground storage tanks at Fleet Management, Bldg. 611 at the Livermore site and at Bldg. 879 at Site 300. A California Air Resource Board Executive Order requires the installation of an enhanced vapor recovery system for all fueling stations in the state of California.

The target completion date for the project is April 1. During construction, unleaded fuel services will be reduced from four pumps to two pumps at the Livermore site and will be suspended for one day (March 15, tentative date) at Site 300. Due to physical space constraints and traffic flow concerns, Fleet Management requests all diesel vehicles be fueled at the fueling dock at Bldg. 519, Heavy Equipment Shop on Avenue H. A fuel card is not required at this location.

During construction, be aware of sig-

nage and barriers as well as potential safety hazards such as traffic congestion, debris, dust, noise, construction equipment and personnel, and tight spaces for maneuvering vehicles in and around the facilities. At the Livermore site, traffic flow will be redirected to be a one-way street south bound on avenue "J," west side of Bldg. 611. North bound vehicles need to go around Bldg. 611 on the east side of the facility to exit.

Contact Fleet Management at 2-7475 with any questions or concerns.

### Mac system OS9 support no longer offered

Institutional support for Macintosh systems running operating system version 9 (OS9) or earlier is no longer provided. The CIO and the Information Architecture Advisory Board (IAAB) approved ending institutional support for Macintosh systems running OS 9 or earlier in December. This decision resulted from implementation of the Laboratory's defined system lifecycle support process, documented on the Desktop Advisory Group (DAG) Website at [http://www-r.llnl.gov/icc/dag/sup-](http://www-r.llnl.gov/icc/dag/support.html)

[port.html](http://www-r.llnl.gov/icc/dag/support.html).

Ending support may impact Macintosh users still running the older operating system in several areas: institutional help desks will no longer provide support; operating system images will no longer be created or supported; and new releases of business applications such as LITE and Extensity will no longer be developed, tested and ensured to work on OS 9 systems. Computer system support provided by your local support technicians will continue at the program's discretion.

The system support lifecycle is designed to improve security and decrease institutional support costs. Security is increased by ensuring LLNL is using operating systems that are still maintained and supported by the vendor (e.g., security fixes are provided). Costs savings result from reducing the number of operating system types that business applications are developed for and by decreasing the complexity of the desktop and network support environment.

## Science pilgrimage



JACQUELINE MCBRIDE/NEWSLINE

Stephanie Malfatti of the Biosciences Defense Biology Division explains the capillary arrays in the DNA analyzer to high school students from the MECCA (Making Electives Count for Career Achievement) program, part of the Tri-Valley Regional Occupational Program that encourages young women to pursue education and employment in science and math. About 50 girls toured biosciences labs and talked with scientists. The program was hosted by the Public Affairs Office.



## NEWS YOU CAN USE

# Science and engineering fair returns to San Ramon

The 9th annual Tri-Valley Science and Engineering Fair (TVSEF) returns March 16 to March 19 at the San Ramon Valley Conference Center, 3301 Crow Canyon Road, San Ramon.

Students participating are 7th through 12th graders from public, private and parochial schools in Danville, Dublin, Livermore, Pleasanton, San Ramon and Sunol.

The fair challenges students to apply creativity and critical thought to the solution of science, engineering and math problems; to encourage the exchange of knowledge and ideas; and to recognize student achievement.

Judging will take place on Thursday, March 17, at 8 a.m. with an awards ceremony scheduled for 7 p.m. The public may view

the exhibition of student projects at the San Ramon Valley Conference Center on Friday, March 18, 10 a.m. to 7 p.m. and Saturday, March 19, 10 a.m. to 3 p.m. There is no charge for admission.

In addition to the Laboratory, this year's organizing sponsors include the Tri-Valley Business Council, Pacific Gas and Electric Company, *The Valley Times*, Tri-Valley Community Foundation, and Chevron-Texaco. The TVSEF is affiliated with the Intel International Science and Engineering Fair, IISEF, which is administered by Science Service, Inc. Senior Division (9-12th grade) Sweepstakes winners of the fair will go on to participate in the International Fair, which will be held in Phoenix, Arizona in May.



## Technical Meeting Calendar

Friday  
**11**

### INSTITUTE FOR GEOPHYSICS AND PLANETARY PHYSICS

"The Ultraviolet Field, the Neutral Gas, and Star Formation in Galaxies," by

David Hollenbach, NASA Ames Research Center. Noon, Bldg. 319, room 205. Property protection area. Foreign national temporary building access procedures apply. Contact: Wil van Breugel, 2-7195, or Lisa Lopez, 3-0250.

Tuesday  
**15**

### LIVERMORE COMPUTING

"LC Customers Monthly Meeting," 9:30 a.m., Bldg. 453, Armadillo Room. Open area. Common use facility. Foreign nationals may attend.

Contact: Teresa Delpha, 3-7329.

### COMPUTATION

"Pressure-Induced Resolidification in Tantalum on BlueGene/L," by Fred Streitz, PAT Directorate, H Division. 10 a.m., Bldg. 453, auditorium, Armadillo Room. Common use facility. Foreign nationals may attend. Contact: Jean Shuler, 3-1909.

### ENGINEERING DIRECTORATE/CENTER FOR NONDESTRUCTIVE CHARACTERIZATION

"A Rayleigh/Compton Backscatter Technique for the Detection of Corrosion in Aircraft Lap Joints," by Jerel A. Smith. 1:30 p.m. Bldg. 155, auditorium. Contact Ann Tyler, 2-4380, or Lori Goerz, 36606.

WEDNESDAY  
**16**

### INTEGRATED COMPUTING & COMMUNICATIONS DEPARTMENT/MACINTOSH TECHNICAL SEMINAR SERIES

"SoftRAID 3" by Mark James and Tim Standing of SoftRAID, LLC. 10:30 am, Bldg. 543, auditorium. Contact Duane Straub, 2-9774.

Thursday  
**17**

### PHYSICS AND ADVANCED TECHNOLOGIES /N DIVISION

"Ab-initio No Core Shell Model - Recent Results and

Future Promise," by James Vary, Iowa State University. 10 a.m., Bldg. 2128, room 1000. Property protection area. Foreign national temporary building access procedures apply. Contact: Erich Ormand, 2-8194, or Annette Cook, 2-7856.

Friday  
**18**

### COMPUTATION

"Open Source Solutions for Managing Technical Information," by Bob Barter, LLNL, Valerie Stanton, LLNL and Munwar Sharif, Cignex. 9 a.m., Bldg. 361, auditorium. Property protection area. Foreign national temporary building access procedures apply.

Contact: Bob Barter, 2-5150, or Valerie Stanton, 2-5755.

### INSTITUTE FOR SCIENTIFIC COMPUTING RESEARCH

"An Introduction to Chapel: Cray Cascade's High Productivity Language," by Bradford Chamberlain, Cray, Inc. 10 a.m., Bldg. 451, room 1025. For more information, see URL (<http://www.llnl.gov/casc/calendar.shtml>). Property protection area. Foreign national temporary building access procedures apply. Contact: Bronis de Supinski (CASC), 2-1062, or Erica Dannenberg, 3-2167.

### INSTITUTE FOR GEOPHYSICS AND PLANETARY PHYSICS

"The Co-Evolution of Black Holes and Bulges: an SDSS Perspective," by Tim Heckman, Johns Hopkins University. Noon, Bldg. 319, room 205. Property protection area. Foreign national temporary building access procedures apply. Contact: Wil van Breugel, 2-7195, or Lisa Lopez, 3-0250.

Tuesday  
**22**

### NATIONAL IGNITION FACILITY

"Synergy at Action: In Accelerator Driven Systems (ADS) Spallation Induced by Protons from High Power Accelerators Meets Fission in Fast Reactors," by Peter Armbruster, GSI-Darmstadt, Germany. 11 a.m., Bldg. 482, room 1103, auditorium. Property protection area. Foreign national temporary building access procedures apply. Contact: Dieter Schneider, 3-5940, or Monica Antone, 3-8200.

WEDNESDAY  
**23**

### ENERGY AND ENVIRONMENT DIRECTORATE

"HCCI Combustion Overview and Current Research," by Salvador Aceves, Energy Technology and Security Program. 1:30 p.m., Bldg. 170, room 1091 (refreshments will be served). Contact: Camille Vandermeer, 3-2672.

Thursday  
**24**

### PHYSICS & ADVANCED TECHNOLOGIES/ V DIVISION

"Plasma based electron linear accelerators from cathode to final focus," by Matthew C. Thompson, Particle Beam Physics Laboratory, University of California, Los Angeles. 10:30 a.m., Bldg. 219, room 163. Postdoc interviewee. Property protection area. Foreign national temporary building access procedures apply. Contact: Stefanie Landes, 2-3201.

### PHYSICS AND ADVANCED TECHNOLOGIES /N DIVISION

"Microscopic Approach of Fission Dynamics Applied to Fragment Mass Distributions in 238U," by Heloise Goutte. 1:30 p.m., Bldg. 211, room 227. Property protection area. No temporary building access for foreign nationals. Contact: Erich Ormand, 2-8194, or Annette Cook, 2-7856.

April  
**1**

### ELECTRONICS ENGINEERING TECHNOLOGIES DIVISION

"Design, Fabrication, and Integration of a Hybrid Micro Power System that includes a Micro Fuel Cell," by André D. Taylor. 10 a.m., Bldg. 153, room 2010. Classification of location: P. Contact: Becka Gordon, 2-2199.

**The deadline for the next Technical Meeting Calendar is noon, Wednesday.** Please submit your meetings via the new Technical Meeting Calendar form on the Web, located at

<http://www-r.llnl.gov/tmc/index.html>

# E.O. Lawrence worked on color TV tube in his garage

*Editor's note: Carol Gerich is manager of the Laboratory History Project, a research effort led by Bruce Tarter, associate director at large, looking at the Laboratory's first 50 years.*

**By Carol Gerich**

DIRECTOR'S OFFICE

Working in his spare time in the garage of his weekend home, Lab founder Ernest O. Lawrence invented a revolutionary, inexpensive tri-color television tube — the predecessor to the technology still used in today's color televisions.

Because of his 1951 discovery, the media labeled Lawrence "father of color television," as well as the "father of the cyclotron."

The garage, enlarged to house extra cots for the graduate students Lawrence motivated to help him on the project, still stands on Alameda Diablo Road in Diablo, located just north of Blackhawk.

The Laboratory History Project, with assistance from Jim Stone, Diablo historian, recently located the garage, which most thought had been destroyed. Edward McMillan, later director of the Radiation Lab at Berkeley, and Luis Alvarez, head of the Materials Testing Accelerator on the Livermore site, also were known to have worked on the series



CAROL GERICH

**E.O. Lawrence, dubbed the father of the color television, worked on his discovery from inside of this garage of his weekend home, which is located in Diablo.**

of color tubes perfected in the garage.

The Lawrence family resided in the Alameda Diablo house part-time from 1949, selling it in early 1950s when the television tube went into production in Oakland. Lawrence received the patent for the color television tube in an unprecedented

(in a suit) with his model television (a flat-screened bulky machine with a large barrel-like apparatus behind the screen) and a blow-up of the new tube. According to the magazine, the television contained such "unorthodox parts as spark plugs, pipe fittings and horseshoe magnets."

personal ceremony orchestrated by the commissioner of patents. Later, the rights to the color tubes were sold to Paramount for entertainment purposes and to Litton for military purposes.

Lawrence explained to the media that the pestering of his children re-sparked his interest in color television, but he had actually built an electronic television during his graduate days at Yale in 1925. His invention received coverage in the *New York Times*, *Newsweek* and the *San Francisco Chronicle*.

The January 1952 edition of *Popular Science* commended Lawrence, then director of the University of California Radiation Laboratory (now Lawrence Berkeley Lab) and Nobel Prize winner, for the simple tube that could be mass produced at a cost only slightly higher than that era's black-and-white tubes. A photo shows Lawrence

## NuSTAR

*Continued from page 1*

NuSTAR will be given the yea or nay nod from NASA by next year for a launch in 2009. It was chosen as one of two proposed flight missions out of 29 submitted proposals.

Telescopes have taken images of the deep sky in the optical band (Hubble), the infrared (Spitzer) and the soft (low energy) X-ray (Chandra). However, the best view to date of the sky with a hard X-ray telescope is so low in sensitivity, the images aren't effective in answering the scientific questions NuSTAR will address. NuSTAR is hundreds of times more sensitive than any previous hard X-ray instrument.

Hard X-rays, which contain as much luminosity as all of the optical starlight in the universe, are emitted from active black holes in the centers of galaxies. They

also are abundantly produced by the most extreme particle accelerators found anywhere in the universe

Of particular interest is the hard X-ray's ability to tell us about the deepest layers of exploding stars (supernovae), revealing newborn chemical elements. One of the discharged elements is 44 titanium.

"44 titanium is a beautiful tracer element of what happened in a supernova," Craig said. "44 titanium is also interesting as it eventually decays and is dispersed throughout the universe in the form of calcium which eventually winds up in our bones and teeth."

Craig said the first goal is to discover black holes on all scales. NuSTAR is hundreds of times more capable of finding new black holes than anything previously launched into space. Most black holes are obscured by dust and are not detectable using an optical, infrared or soft X-ray instrument. However, hard X-rays can penetrate that dust and matter to detect even the most obscured supermas-

sive black holes.

"I grew up in this field and I thought we knew a lot about the physics of these sources, but it is now clear we have only scratched the surface," Craig said.

Livermore has partnered with the California Institute of Technology (the lead institution on NuSTAR), Columbia University, the Danish Space Research Institute, the Jet Propulsion Lab and several other institutions to build and launch NuSTAR. NASA is scheduled to review the project again in early 2006 when it will make a final decision on whether NuSTAR will launch.

Craig said NuSTAR has a spin-off technology in the homeland security arena. Hard X-rays are a key way to detect and identify nuclear material. The same technology that is being used to probe the universe also has applications to advance the development of radiation detection equipment needed to protect the nation from nuclear terrorism.

## Names on 'Wall of Hope' fuel Cancer Society effort

The American Cancer Society-sponsored "Daffodil Days" is winding down and fresh flowers will be delivered and distributed March 22.

Lori Delage of Plant Engineering's Maintenance Reinvestment Program is one of this year's volunteers for the annual Lab fundraiser. Delage has a personal desire to raise funds to fight cancer — she lost a brother to the disease.

This year, Delage collected more than \$1,600 from workers in her area in Bldg. 511. To add a personal touch, and with the help of the Cancer Society, she created a "Wall of Hope" in Bldg. 511.

Delage asked contributors to write the names of their loved ones or friends who have either survived cancer or have passed away, on paper daffodil cut outs, supplied by the Cancer Society. The names are displayed on a bulletin board for workers and building visitors to view. In this way, contributions are posted in memory of particular individuals.

"Posting names of cancer victims has given us a chance to remember our loved ones and share memories with one another of relatives, friends, and co-workers who were affected by cancer," Delage said. "The 'wall' has brought people in the building together."



JACQUELINE MCBRIDE/NEWSLINE

**Lori Delage of Plant Engineering arranges names of cancer victims on the "Wall of Hope" in Bldg. 511, as part of the American Cancer Society's "Daffodil Days" campaign.**



# CLASSIFIED ADS

See complete classified ad listings at  
<https://www.ais.llnl.gov/newsline/ads/>

## AUTOMOBILES

2001 Dodge Stratus RT Coupe. Automatic transmission, fully loaded, 6-disk CD, leather interior, moon roof, new tires. Excellent Condition. 10K or best offer. 209-599-4840.

1995 - Ford Taurus wagon w/third seat. Approx. 160,000 miles. One owner. \$1,500.00. 209-823-8089

2001 - Silver Toyota Tacoma Extra Cab; TRD Package; 4WD; Bedliner & Tow Package; 64,000 miles; asking \$16,000.00. 925-980-1895

1997 - ATTENTION T-BIRD lovers. Thunderbird LX excellent condition, 27k mi. quality sound, cassette. Drives like a dream. Good gas mileage. 5,998.00 510-582-2938

1995 - BMW 325is White automatic, Full Power, Sports Package, Great Condition. Low Miles 75k mi. Only \$8500. 925-449-7480

1997 - Toyota Paseo Convertible, Automatic, Metallic Black, 57250 miles, AC, Cruise, Power Windows/Locks, Alloy Wheels, Original Owner, \$6500, call Diane 925-829-1794

2002 - Mustang GT Convertible. 62k auto transmission black leather/interior. 6-cd changer/flowmaster exhaust. \$14,500. Pics available: logrande1@llnl.gov 925-487-5653

2002 - Honda Odyssey EX-L w/Navigation and 10 Disc DVD changer. Granite Green, 39k miles, \$24,000 209-830-0183

2001 - Saturn LW 300 Wagon. Mint condition, fully loaded, all options, white w/ gray leather interior. 28k miles. \$10,975 obo 925-447-5947. 925-447-5947

1996 - ACURA INTEGRA, 2 dr. Fully loaded, 4 cly., leather, AC, moon roof. 189K miles. Asking \$4500.00/BO. Must see. Call after 7:00 p.m. 925-980-1613

2003 - VW New Beetle Convertible, Dk Blu w/Blk Canvas Top, auto, all power, AM/FM/XM/Cassette w/6-CD changer. 39800 mi. Excellent Condition. \$19,000. 707-310-0942

1994 - Subaru Loyale station wagon, ex. condition, pw windows, locks, cc, ac, AM/FM cassette, roof rack, \$3,675. 925-855-1314

65 - Restored Mustang. Prairie Bronze color. Price reduced! \$20k o.b.o. Call for pics. Located in Stockton. Must see! 209-957-7117

1997 - Ford Thunderbird, 91k miles, V6, Silver, 2 doors, AT, AC, power windows, power locks, good condition. \$3200/OBO 408-398-6771

1998 - Audi A8 quattro luxury sports car, excellent condition. It looks as good as it drives. Leather, heated seats, sunroof etc...96k frvy mls. \$16.5K. 925-784-7166

1997 - Dodge Grand Caravan SE. Front & rear Air, Power Windows & doors, child seats, Good condition. Runs great, 145000 miles. KBB \$4330 or best offer. 209-815-5991

2002 - Toyota Tacoma, prerunner, ext.cab, V6, auto, CD player. ONLY 19K miles. 209-483-5379

1999 - Lincoln Limousine - tv, vcr, cd, bar, j-seat, leather interior, excellent condition, \$25K obo, 510-582-2612

1995 - Suburu Legacy Wagon. AWD, automatic transmission, a/c, cruise. Dark blue. 100k miles. Runs great, looks good. \$3900. 925-606-6599

2001 - Lexus RX300-Fully loaded, Excellent condition, leather, CD changer, sunroof, 57k miles KBB 23K, asking 21K. 925-361-5296

1994 - Ford Escort LX hatchback 2D, good condition, new brakes, AC \$1500 925-443-8858

1999 - Pontiac Grand Prix GT. 66k miles, white/grey int, 6 cyl, all pwr, cd/cass, leather, 4 dr. \$7500 OBO 209-764-0523

## AUTOMOBILE ACCESSORIES

Trailer Hitch for 90-93 Honda Accord. Complete w/receiver, ball, wiring/light module. 200# tongue/2000# load rating. \$75 outright/\$100 installed 925-455-0577

15 inch TIRES: Two 235/75/15 for Truck or big car - good tread, one mounted on 6 bolt rim \$25/ both. Livermore. 925-447-7070

## BICYCLES

Mongoose Xr200 21 speed mountain bike, front disk brake, front and rear shocks, \$140 925-377-6537

## BOATS

Older Oceans Jet-Ski Kawasaki 300 1986- low hours-\$125. 925-447-8283

2002 Glastron gx-185, 65hrs tower bimini am, fm, cd, perko switch stainless prop 15,500 obo 925-373-3312

## CAMERAS

Sigma 28-200 zoom lens, up to 4x, Nikon mount, \$110. 925-377-6537

## ELECTRONIC EQUIPMENT

GameCube Platinum Edition 5 games, 3 controllers, memory card, EXCELLENT condition, rarely used. asking \$265, call for details or leave message. 925-449-3855

HP COLOR printer, only used twice. 30.00 510-537-7222

XBox Game System w/2 controllers, 3 games: Halo, Halo2, and Blood Rayne \$150 Call after 6:30pm 209-823-1664

## GIVEAWAY

ShopVac, 6 gallon wet/dry with accessories and manual. 925-449-6911

Light bars, 3 ea, 6, 8 and 10 lamp with ceramic sockets, working condition. 925-961-1658

## HOUSEHOLD

Double bed w/mattress & boxspring, matching headboard, night stand, 3-drawer dresser w/mirror, desk w/bookshelf, chair \$550. 209-823-8089

8X14X9 TuffShed, new. 2 skylights, turbine vent, window. Must be disassembled. paid \$3100 Make offer 925-513-4767

Bedroom furniture for little girl. Whitewashed with flower design. Several Pieces. Call for description. \$500 for all. 209-456-7841

Bissell vaccum, excellent working condition. Very powerful, like new. Attachments included. 40.00. Have too many. 510-537-7222

Yard Sale Saturday 3/12 9am-4pm. 1771 Dawn St. Livermore. Lots of infant girl clothes, maternity clothes, misc baby and household items. 925-371-1607

Cool mist humidifier, \$5. Ultrasonic humidifier, new, \$25. 925-454-0877

Lift Chair - 4 years old, good condition. \$250 or BO 209-239-2966

Crib - beautiful natural maple - \$50. 925-447-1954

New baby or grandbaby? Graco Pack-n-Play, used 3-4 times, includes some bedding. \$30.00 925-961-1658

Oak coffee table and two end

tables. Leaded glass inserts, claw feet. Beautiful set. \$250 925-606-0234

Freezer, Chest style, 9cu ft. In excellent condition. Works great. White color. 100\$ 209-538-1568

Portable, evaporative air conditioner. Very little use, looks new. \$50 925-454-5214

Fire Truck Toddler Bed with mattress. Very good condition, has a night light on top. Retails for over \$150. Comes from a non-smoking home. 925-456-6023

Lazy Boy Sleeper Sofa, Medium Blue, Very Good Condition. \$350.00 209-522-8127

Fouton - Queen size. Honey Oak frame in very good condition. Mattress is in fair condition. Both for \$60. 925-606-9781 ask for Michael. 925-606-9781

Crib with mattress. Color - Natural Pine. Has drawer below. Can convert to toddler bed. Excellent condition. \$100. 925-516-3768

Three piece solid oak wall unit, 95x20x76. Asking \$200. 925-371-1612

Pellet stove, Breckwell P24FS, pedestal, 13 yr. old, excellent condition, retails new for more than \$2000, \$850 OBO. 925-455-5816

## MISCELLANEOUS

Boys clothes, sz. 4/5, jackets, pants, shirts, short sets, pajamas. Hiking boots, sz. 12. Great condition. \$1-\$5. 925-454-0877

Preschool toys, games, puzzles, videos, software. Discovery toy items, Reader Rabbit, more. Excellent condition, low prices. Call for details. 925-454-0877

Cal King Mattress (no box apring) for sale for \$50, very good condition. Call cell 925-683-9535 or 925-803-9596

Refrigerator - Frigidaire, Frost Proof, 18 Cu Ft - Works Great! \$100.00 925-426-8224

Orchid lovers!!! Get them while they last. Orchid plants for sale large variety of colors and sizes!! For more information call 510-581-6389

Irish flute: Lark in the Morning brand, Pratten system wood flute in D, almost new, similar to Ralph Sweet models but with better tone. 925-443-4231

Estate Sale - March 12&13, 9am-3pm, 609 Pelican Ct., Livermore. No earlybirds!

Original Oil Painting - Beautifully framed picture of a nature scene. 42 inches X 30 inches. Must see to appreciate. \$35.00 925-449-8035

Cardioglidle plus push/pull exerciser, excellent condition, \$75/obo. 209-895-7050

Retractable casters for contractor style saws. Like new. \$20. 209-239-8984

## MOTORCYCLES

1998 - Suzuki DR350S Dual Sport, 6Kml, Ex cond. elec start, large gas tank, extras, \$3K 209-832-4535

## MUSIC INSTRUMENTS

Guitar, Lotus Amigo, 3/4 size, perfect condition with case, \$120 925-484-9028

Piano: J & C Fischer studio upright, New York City, beautiful solid rosewood case, restrung 2004, excellent tone quality. \$1200 925-443-4231

## PETS & SUPPLIES

2 lizard enclosures - 1 plexiglass - \$25, 1 wood/plexiglass/mesh - \$50. 925-447-1954

## RECREATION EQUIPMENT

Tuff Stuff Odyssey 5 Total Body Home Gym. \$500 for picture, features, and specifications. 925-454-8982

Rollerblades, Mens size 11, Womens size 8, both in great condition. Includes knee guards and wrist guards. \$50 each pair, \$85 for both pairs. 925-998-5702

Windsurfer: 12 ft OBrien Sensation XL, with 2 masts, 5 sails and accessories. \$150 obo. 925-443-4231

Weider Crossbow exercise machine. Like new. \$250.00 obo 209-836-2990

Genesis 2000 LP gas barbecue, wood shelves, good condition. \$75/obo. 209-895-7050

Nordic Track, good condition, \$20. 925-455-5816

## RIDESHARING

Express your commute, call 2-RIDE for more information or visit <http://www-r.llnl.gov/tsmp>.

Lafayette - LaMorinda Vanpool (also WALNUT CREEK stop at Rudgear commuter lot): reclining seats, reading lights, 7:45-4:45, \$105/mo (pre-tax reduction available) 925-943-6701, ext. 2-3005

Farmington - Car pool. AWS T-F 6:00- 4:30 Leave Farmington @ 4:30 AM 209-785-1215, ext. 2-7637

Orinda - Lamorinda carpool seeks 4th rider/driver. Meets near St. Stephens and Highway 24. Lab hours 8am-4:45pm 925-253-0498, ext. 2-9823

Clayton/Concord - For riders on a 7:30-4:15 schedule. We meet in Clayton and Concord. One vacancy available, please contact us immediately. 925-209-8880, ext. 3-4351

Walnut Creek/Pleasant Hill - For riders on an 8:00-4:45 schedule. We meet at Pleasant Hill BART (7:08) and Rudgear Road Park N Ride (7:19). Luxury van w/individual seats, lamps. 925-930-0415, ext. 2-6593

## SERVICES

QUALITY PAINTING, take advantage of low season prices now. Excellent references, prep work and workmanship. 25 yrs exp. Call before it gets too hot. 510-537-7222

ClutterLess(CL) Self Help Group. Clutter stressing you out? Mondays 7-8:30 PM. Come: Pleasanton Presbyterian, Rm 7, 4300 Mirador Drive, or call 925-443-0766

Looking for daycare for your infant or toddler? - or afterschool care for your elementary aged child? Call April 925-456-7172

## SHARED HOUSING

Livermore - furnished room for rent. Clean/quiet/pool. Close to bus/bike path. No pets/no smoking. \$550.00/month. Share utilities. Deposit. Mature adult. 925-449-1128

Livermore - Clean room for rent. Female. 5 miles from Lab. No pets/no smoking. \$600.00/mo. Utilities included. Deposit. Available April 01. 925-443-0218

Mountain House - 15 miles to LLNL, Brand New, Single Room, small kitchen, full bath, separate entry and mail box, no laundry, possible ride sharing,

500/month+deposit 209-830-7130

RIPON - Apt. For Rent 1 BR furn tower (3 floors) Country atmosphere in town \$500.00 a month incl. util. and cbl NO SMOKING 209-599-2974

## TO TRADE

Windsurfing equipment for kayak equipment 510-582-2612

## TRUCKS & TRAILERS

2002 - Two horse, slant load, SilverLite aluminum horse trailer, \$9,250. Photos at website; <http://www.pianosearch.org/horse-trailer/horsetrailer.html> 925-736-1463

1996 - RANGER XLT, good running work truck. Bedliner, cassette, V6, extra cab, A/C, alarm. Good condition. 5,600.00 510-537-7222

2001 - Toyota Tundra extended cab SR5 4x4, w/tow pkg, nice camper shell, roof racks, A/C, PD, PW, Cass&CD, 37K, \$18,150. 925-373-9608

1967 - Custom Series Chevy Truck, new motor and transmission - \$2,500 obo. 925-550-3809

1995 - Chevy 2500 ex/cab 4x4, 8ft. bed, diesel engine, runs excellently, gooseneck hitch, great shape, \$8500 209-832-7655

1994 - Boulder motorhome 34 ft class A. New tires queen walk around rear bed. Very good condition 23,000 miles \$ 25,000. 925-525-2343

2000 - 21 Ft. Wilderness Hybrid Trailer, front & rear pop outs sleeps 7, ultralite (3200 lbs) \$8,900 925-455-8222

## VACATION RENTALS

Nice mountain cabin above Arnold. 4 bedr, 2 bath. Sleeps 10-12. Plan ahead for summer fun with creeks, hiking, fishing. Some snow left. 925-245-1114

Sooo cute beach cottage in Santa Cruz. 2 bedr, 2 bath, 4 blks to beach. Spa. Week nite special- \$75.00/nite thru April. Plan ahead for summer fun. 925-245-1114

Maui, HI - Kahana Reef oceanfront 1BR/1BA condominium. Beautiful two-island view, oceanside pool, and BBQs. LLNL rates for year-round reservations. 925-449-0761

SOUTH LAKE TAHOE - 3 Bedroom 2 Bath Chalet, comfortably furnished, all amenities, close to all skiing, 209-599-4644

Mendocino County - - Ocean View - large 4bd/4.5ba home in quiet neighborhood, fireplace, hot tub, private courtyard, deck, 3Q/1F/bunks, pets ok w/ deposit 925-455-5942

## WANTED

Women wanted for coed soccer teams for the Tracy Adult Soccer League. Games are every Sunday. Please call Diana. 209-598-7320

Donation of old Windows 98/Me PC with CDROM, USB ports, PCI slots, for local non-profit swim league timing system. 925-443-5693

Wanted: Pool table. 209-368-5822

Wanted. Tile cutter. If you have tile cutter cluttering up your garage, I would like to buy it. Ask for Jim. 925-245-1414

VHS tape of NYPD Blue final program on March 1, 2005. To borrow, not to keep. 925-443-2245

Upgrading your at home system? Non-profit org needs PC running Windows 2000 or XP. You can write it off your taxes! Call between 3pm-7pm. 925-443-0367

**Due to space limitations, Newsline may withhold ads that have already run. They will still appear on the Web.**

**BETHE***Continued from page 1*

Anastasio. "His extraordinary contributions to basic science have set many of the directions for the future of physics."

Jim Wilson, a retired B Division physicist, collaborated with Hans Bethe on supernova research over a period of more than 20 years and co-authored articles for science journals. "Hans was interested in what makes a supernova go bang," Wilson said. "He was hoping to find a simple model for supernova."

Their collaboration started in the late 70s after they met at a small conference, Wilson said, noting only a small group of physicists were working on the "supernova problem" at that time.

"Hans Bethe impressed me with the way he worked," Wilson said, recalling that Bethe always requested a copy of the complete output of Wilson's calculations, which usually consisted of several hundred pages of data.

"Hans would go through it all and make comments. He didn't avoid work," Wilson said. "Even today there's still disagreement over how supernovae work. But, Hans did a lot of important work that has helped our understanding of the supernova problem."

"Hans Bethe was a very friendly type and he was very easy to get along with," he said, adding he has kept all the correspondence from their collaboration. The last article they co-authored, titled "Revival of Stalled Supernova Shock by Neutrino Heating," was published in the journal *Astrophysics* in 1985.

Bethe's deep and abiding belief in science was unaffected by his work on developing the first atomic bomb. "The intellectual achievements of pure research are one of the things that make life worth living," he once said. Even when he had just witnessed the blinding flash from the detonation of the first nuclear explosion at the Trinity site in the New Mexico desert on July 16, 1945, he professed only to a concern about the atomic bomb's functioning. "I am not a philosopher," he explained.

Yet he was deeply committed to humanitarian values, as shown in his efforts to limit the use of nuclear weapons and his work to promote the peaceful use of nuclear energy. "Science is always more unsolved questions, and its great advantage is that you can prove something is true or something is false. You can't do that about human affairs — most human things can be right from one point of view and wrong from another," he once said.

Despite the turmoil of history, Bethe remained committed to the idea of physics as a thing of beauty leading to discovery and understanding, a quest that he called "the spirit of physics." It was a spirit enunciated by his famously optimistic phrase "I can do that,"

always said in the face of opposition or adversity.

During World War II Bethe was a key figure in the building of the first atomic bomb as head of the theoretical physics division at Los Alamos. Bethe would later recall how "two elder statesmen" told J. Robert Oppenheimer, director of the Manhattan Project, "Look here, you can't run the theoretical division if you run the laboratory at the same time, and there has to be a theoretical division. It has to be organized. And so the obvious person to put in charge of the theoretical division is Bethe."

But after World War II Bethe became a persistent champion of nuclear arms control, helping to persuade the White House to ban atmospheric nuclear tests in 1963 and antiballistic missile systems in 1972. And he stood firm in his opposition to President Ronald Reagan's Strategic Defense Initiative, the missile defense system known as Star Wars. Bethe and Edward Teller, who first became friends as physics students in Germany, later worked together on the Manhattan Project. While they later disagreed on policy issues, they continued to share great optimism about the possibilities of science. In a videotaped tribute broadcast at a commemoration ceremony for Teller in November 2003, Bethe said, "I knew Edward Teller before almost anyone else now alive. I was a second-year student in Munich in 1927. One of my duties was to grade the homework papers of first-year physics students. One student stood out. That was Edward Teller."

"When I read Edward's memoirs, I was reminded of the good times. They were very good — among my most treasured memories. And that's how I prefer to remember my friend," Bethe said.

Bethe also was a deeply committed, even sensitive, teacher, and from 1945 until his retirement from active teaching in 1975 he trained and inspired a large number of graduate students. One of them, Freeman Dyson of the Institute for Advanced Study at Princeton, once noted that Bethe would often continue classes over lunch "and that's where most of the teaching was really done."

A number of Lab physicists, including Steve Cochran, had the good fortune to study under Bethe. In 1971, as a student working for his Ph.D in physics at Cornell, Cochran served for a year as a teachers assistant to Bethe for one of

**Hans Bethe**

the professor's quantum mechanics classes.

"He was a very pleasant, easy-going person, but he was also technically rigorous; he wanted the right answers, which meant the TAs had to really do the problems," recalled Cochran, the Lab's acting associate director for Nonproliferation, Arms Control and International Security.

Kent Johnson, chief of staff for Defense and Nuclear Technologies, was a doctoral student in a quantum mechanics class taught by Bethe at the time it was first announced that the then 60-year-old physicist had been awarded the Nobel Prize for Physics. "I was a student in the first class

he taught after the Nobel Prize was announced. We all stood and applauded," Johnson recalled. "But he just thanked us and went on with the lecture."

Hans Albrecht Bethe was born July 2, 1906, in Strasbourg, now in France but then part of Germany. He showed an early genius as a mathematician, studying physics at the University of Frankfurt and doing research in theoretical physics at the University of Munich, where he was a student of Arnold Sommerfeld, the teacher of Wolfgang Pauli and Werner Heisenberg, and where he received his doctorate in 1928. In 1930 and '31 he received fellowships, first to the University of Cambridge and then to the Institute of Physics in Rome, where he worked with Enrico Fermi. He taught at Frankfurt and Munich. At the Technical University of Stuttgart he was assistant to Paul Ewald, professor of theoretical physics, who would become his father-in-law a decade later when Bethe married Rose Ewald, then a student at Smith College in Massachusetts, and who graduated from Cornell in 1941.

During his years as a physicist he published papers in every decade from the 1920s through the 2000s. In 1995 Bethe's colleagues, students and friends marked his 60 years at Cornell with a two-day tribute to his life and work. "If you know his work," said John Bahcall of the Institute for Advanced Study, delivering his own appreciation, "you might be inclined to think he is really several people, all of whom are engaged in a conspiracy to sign their work with the same name."

In addition to his wife, he is survived by two children, Henry, of Ithaca, and Monica, who lives near Kyoto, Japan, and three grandchildren.



FRANK NUNEZ/TID

## Crystal clear

From left: Regent Mark Ornellas and Regents-Designate Richard Rominger and Eric Juline are given a briefing on the National Ignition Facility by George Miller, associate director for NIF. Regent officers of the Alumni Association of the University of California visited the Laboratory Monday. Ornellas is president of the UC alumni association, Rominger, secretary, and Juline, treasurer. The regents were given an overview of Lab programs by Director Michael Anastasio. They also received briefings on homeland security, stockpile stewardship and a demonstration by the Advanced Simulation and Computing program.



# LLNL'S WILD SIDE

## Protecting the native frog

Text and photos by Michael G. van Hattem

The California red-legged frog (*Rana aurora draytonii*) was listed as "threatened" under the Federal Endangered Species Act (ESA) in 1996. At that time, the U.S. Fish and Wildlife Service had determined that the frog had been extirpated from 70 percent of its historic range from Redding, Calif. to Baja California, Mexico. The California red-legged frog, the largest native frog in California, is widely known for its vibrant coloration, as well as its jumping ability (Mark Twain's jumping frog of Calaveras County). California red-legged frog populations decreased markedly in the late 1800s when they were hunted for human consumption; subsequently habitat loss, and the introduction of non-native predators (i.e. bullfrogs and fish) have resulted in further population declines and isolation of remaining habitat. At LLNL, Environmental Protection Department wildlife biologists work to conserve and enhance California red-legged frog populations at the Livermore site and Site 300 while balancing the needs of LLNL projects and operations.

### California red-legged frog life cycle

(Left to right)

- Egg mass (2,000 – 4,000 eggs)
- Metamorphic larva
- The California red-legged frog



### Our largest native frog

(Left to right)

- Gravid female frog
- Front view of adult frog
- Adult frog being tracked by biologists (note radio transmitter belt) in the Arroyo Las Positas (Livermore site)



### Livermore site and Site 300 habitat

(Left to right)

- Drainage Retention Basin
- Arroyo Las Positas
- Elk Ravine (Site 300)



### Management

(Left to right)

- Biologists electrofishing the Drainage Retention Basin to remove non-native fish
- Biologist removing a bullfrog egg mass
- Silt fencing used to exclude frogs from a project area where they would be at risk



## WRIGHT

Continued from page 1

sion, will help scientists measure how fast the solar system is expanding in relation to how fast the entire universe is expanding, Wright said.

To date, the CMB work that has been conducted shows the universe is made up of 73 percent dark energy, 23 percent cold dark matter and 4 percent atoms.

"Finding the nature of dark energy and cold dark matter will give cosmologists plenty to work on for the next century," Wright said.

Wright's work on COBE earned him NASA's Exceptional Scientific Achievement Medal in 1992. He is now working on WMAP. Wright also is an interdisciplinary scientist on the Spitzer Space Telescope, launched in 2003, and the principal investigator on the Wide-field Infrared Survey Explorer (WISE), to be launched in 2008.



JACQUELINE MCBRIDE/NEWSLINE

Edward Wright



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